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1          ;***COPYRIGHT 1969, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.***
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3
4          ;THIS SUB-PROGRAM ASSEMBLED WITH SYSTEM PARAMETER FILE - S.MAC(V414)
5          XLIST
6          LIST
7          TITLE DSKINT - PDP-10 RC-10 DISK INTERRUPT SERVICE - V403S
8          SURTTL A. FRANTZ/TH TS 5 FEB 69
9          XP      VDSKIT,403*
10         ;PUT VERSION NUMBER IN GLOB LISTING AND LOADER STORAGE MAP
11
12         ENTRY RCXINT ;THIS SYMBOL IS SOLELY TO PERMIT SYSTEM
13         RCXINT:    ; BUILDER TO RETRIEVE THE CORRECT BINARY FILE.
14
15         INTERNAL   DSKINT,DFWRT,DFRED,DSKFDG,DISKUP,FTCHECK,FTMONP,FTRCHK
16
17         EXTERNAL   DSKCHN,DSKBIT,DSKSAV,DFINT,RCXIOC,RCXCCW
18
19         000170 DSK=170 ;DEVICE NUMBER ASSIGNED TO THE MODEL RC-10 DISK SYNCHRONIZER.
20
21
22         ;CONI FORMAT FOR THE MODEL RC-10 DISK SYNCHRONIZER --
23
24         ;BITS 00 - 17 MAINTENANCE PANEL SWITCH SETTING INDICATORS --
25         ;BITS 00 - 04 UNUSED
26         010000 000000 MSS=1B5 ;SET INDICATES "MAINTENANCE SEGMENT SELECTED" (SEGMENT 81),
27         004000 000000 PLGSW=1B6 ;1 = WRITE-PROTECT EVERYTHING BELOW (LESS THAN) THE BOUNDARY,
28         ; 0 = WRITE-PROTECT EVERYTHING ABOVE (GREATER THAN) BOUNDARY.
29         ;THE CURRENT IMPLEMENTATION OF THE RC-10 DISK SYNCHRONIZER
30         ; DOES NOT PERMIT SENSING THE INCLUSION OF THE BOUNDARY.
31         ;BITS 07 - 17 THE WRITE-PROTECTION BOUNDARY (DISK AND TRACK NUMBER).
32         400000 DTIP=1B18 ;SET INDICATES DATA TRANSFER IN PROGRESS.
33         ;BITS 19 -29 ERROR CONDITION INDICATORS (ERROR WHEN SET) --
34         200000 SRCHE=1B19 ;SEARCH ERROR (DISK TIMING TRACK PROBLEMS!!)
35         100000 DDE=1B20 ;DISK DESIGNATION ERROR
36         040000 TSE=1B21 ;TRACK SELECT ERROR (OR EXCEEDS SYSTEM CAPACITY)
37         020000 MRDY=1B22 ;DISK NOT READY (OR NON-EXISTENT DISK REFERENCED)
38         010000 PSF=1B23 ;POWER SUPPLY FAILURE
39         004000 DPAR=1B24 ;DISK PARITY ERROR
40         002000 CHOPAR=1B25 ;CHANNEL DATA PARITY ERROR
41         001000 CHCPAR=1B26 ;CHANNEL CONTROL PARITY ERROR
42         000400 NXMEM=1B27 ;NON-EXISTENT MEMORY REFERENCED
43         000200 WRPE=1B28 ;ATTEMPTED TO WRITE IN PROTECTED DISK AREA (SEE BITS 06 - 17)
44         000100 OVR=1B29 ;OVERRUN, I.E., MEMORY DIDN'T RESPOND QUICKLY ENOUGH
45         ;BIT 30 CHANNEL CONTROL WORD WRITTEN IN MEMORY (THIS BIT IS
46         ;TURNED ON ON ALMOST ALL TERMINATIONS.)
47         000020 BUSYRT=1B31 ;BUSY (SYNCHRONIZER PERFORMING A COMMAND SEQUENCE)
48         000010 DONEFLG=1B32 ;DONE -- THIS ACTUALLY CAUSES THE INTERRUPT.
49         ;BITS 33 - 35 PI CHANNEL SELECTION BITS.
50
51         ;COMBINATIONS OF ERROR BITS GROUPED BY TYPE --
52         006000 DATERR=OPAR:CHOPAR ;DATA ERRORS.
53         211100 DEVERR=SRCHE!PSF!CHCPAR!OVR ;DEVICE ERRORS.
54         160400 SFTERR=DDE!TSE!NRDY!NXMEM ;SOFTWARE-PREVENTABLE ERRORS.
55         377700 ALLERR=DATERR!DEVERR!SFTERR!WRPE ;ALL POSSIBLE ERRORS.

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56          ;CONO FORMAT FOR THE MODEL RC-10 DISK SYNCHRONIZER --
57
58          ;BITS 00 - 17  UNUSED
59          ;BITS 18 - 19  SELECT DISK FOR SECTOR COUNTER READ-OUT (SEE DATAI BITS 28-35)
60          ;BITS 20 - 29  RESET THE CORRESPONDING CONI ERROR BIT
61                      ;(BUT PSF MAY REFUSE TO RE RESET)
62          000040 WHCCWO=1R30 ;WRITE THE CHANNEL CONTROL WORD INTO MEMORY (NOW!)
63          000020 STPBIT=1R31 ;STOP -- IMMEDIATELY CEASE PRESENT I/O AND CLEAR THE CHANNEL,
64          000010 RESETB=1R32 ;RESET THE DONE FLAG (CORRESPONDING CONI BIT) TO CLEAR INTERRUPT
65          ;BITS 33 - 35  PI CHANNEL SELECTION BITS
66
67
68          ;DATAI FORMAT FOR THE MODEL RC-10 DISK SYNCHRONIZER --
69
70          ;BITS 00 - 17  UNUSED
71          ;BITS 18 - 23  PARITY REGISTER
72          ;BITS 24 - 25  UNUSED
73          ;BITS 26 - 27  DISK SELECTED BY BITS 18-19 OF LAST CONO
74          ;BITS 28 - 35  CURRENT SECTOR POSITION OF SELECTED DISK (FOR LATENCY OPTIMIZATION!)
75
76
77          ;DATAU FORMAT FOR THE MODEL RC-10 DISK SYNCHRONIZER --
78
79          ;BITS 00 - 17  DISK ADDRESS SELECTION
80                      ;BITS 00 - 01  DISK SELECT
81                      ;BITS 02 - 10  TRACK SELECT (RCD, BUT FIRST CHAR IS JUST 1 BIT)
82                      ;BITS 11 - 17  SEGMENT SELECT (RCD, BUT FIRST CHAR HAS ONLY 3 BITS)
83          ;BITS 18 - 23  INITIAL PARITY REGISTER SETTING (ZERO EXCEPT FOR DIAGNOSTIC PROGRAMS)
84          004000 DDSKPE=1R24 ;DISABLE DISK PARITY ERROR STOP
85          002000 DCHNPE=1R25 ;DISABLE CHANNEL DATA PARITY ERROR STOP
86          001000 WRBIT=1R26  ;SET MEANS WRITE ON DISK, RESET MEANS READ FROM DISK
87          ;BITS 27 - 34  ;CORRESPONDING BITS OF INITIAL CHANNEL CONTROL ADDRESS, HENCE,
88                      ; THIS ADDRESS MUST BE EVEN AND IN THE FIRST 1K OF CORE MEMORY!
89          ;BIT 35        ;WRITE EVEN PARITY DATA INTO MEMORY (DIAGNOSTICS ONLY!)

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DSKINT - PDP-10 RC-17 DISK INTERRUPT SERVICE - V403S
A. FRANTZ/TH TS 5 FEB 69

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143 000034 263140 000000

POPJ PDP,

!SUBROUTINE EXIT.....***

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90          ;SUBROUTINE "DFWRT" IS CALLED TO START UP A WRITE ON THE DISK,
91
92          ;CALLING SEQUENCE --
93          ;   PUSHJ   PDP,DFWRT
94          ;   RETURN WHEN WRITE HAS BEEN STARTED.
95          ;ENTRY CONDITIONS --
96          ;   C(TAC 18-35) = LOGICAL BLOCK NUMBER AT WHICH TO START WRITING,
97          ;   C(TAC1) = IOWD, I.E.,
98          ;   C(TAC1 00-17) = 2'S COMPLEMENT OF WORD COUNT TO BE WRITTEN
99          ;   C(TAC1 18-35) = ADDRESS OF FIRST DATA WORD TO BE WRITTEN
100         ;EXIT CONDITIONS --
101         ;   THE REQUESTED WRITE HAS BEEN BEGUN
102         ;   TAC AND TAC1 HAVE BEEN DESTROYED
103
104 000000 717300 000020 DFWRT: CONSZ  DSK,BUSYBT  ;FOR SAFETY SAKE BE SURE THE DISK IS
105 000001 254000 000000' JRST    , -1  ; FREE NOW (THIS MAY BE A REDUNDANT CHECK),
106 000002 202100 000172' MOVEM   TAC1,WRCHNL ;SET UP CHANNEL COMMAND SEQUENCE.
107 000003 402000 000173' SETZM  WRCHNL+1  ;MAKE SURE NEXT COMMAND IS 0, SO CHANNEL
108                                     ; WILL NOT WRITE ALL OVER DISK
109
110          IFN    FTRCHK,<
111 000004 201102 000001      EXTERN SATM2
112                                     ;CLEAR LH AND COMPARE WITH
113 000005 307100 000000      MOVEI  TAC1,1(TAC1)  ; FIRST WORD AFFECTED
114                                     ;COMPARE ABS CORE ADDRESS TO BEGINNING
115 000006 254200 000006'    CAIG  TAC1,SATM2  ;OF SAT TABLE-2
116                                     ;HALT - DO NOT WRITE OUT MONITOR - CONTINUE
117                                     ;WILL LOOP
118
119 000007 201100 000172'    >    MOVEI  TAC1,WRCHNL
120 000010 202100 000000      MOVEM   TAC1,RCXIOC  ;RCXIOC IS MAGIC EVEN LOCATION IN FIRST 1K OF CORE,
121                                     ;CONVERT LOGICAL BLOCK NO. INTO PHYSICAL DISK ADDRESS.
122 000011 260140 000130'    PUSHJ  PDP,CNVBLK
123                                     ;REQUEST WRITE (INSTEAD OF READ)
124 000012 435040 001000      ORI     TAC,WRBIT
125 000013 435040 000010'    DFWRTC: ORI     TAC,RCXIOC
126 000014 202040 000201'    MOVEM   TAC,DFORDR  ;SAVE RC-10 DATA0 COMMAND
127 000015 551040 000000      DSKFDG: HRRZI  TAC,DSKCHN ;THIS INSTRUCTION TEMPORARILY ALTERED DURING "ONCE".
128 000016 435040 377710      IORI   TAC,ALLERR!RESETR
129 000017 505040 000010      HRLI   TAC,DONEFLG  ;TO SET INTERRUPT CONDITIONS IN DSKCON.
130                                     ;READY THE DISK SYNCHRONIZER ---
131                                     STARTDV DSK*EXTERNAL PIOFF,PION
132 000020 700600 000000      CONO  PI,PIOFF
133 000021 717201 000000      CONO  DSK,(TAC)
134 000022 546040 000170'    HLRM   TAC,DSKCOM
135 000023 700600 000000      CONO  PI,PION
136 000024 550060 000013'    HRRZ  TAC,@RCXIOC  ;COMPUTE AND SAVE THE VALUE WHICH THE
137 000025 574120 000024'    HLRE  TAC1,@RCXIOC ; CHANNEL CONTROL WORD SHOULD CONTAIN UPON
138 000026 274040 000002      SUB   TAC,TAC1      ; SUCCESSFUL COMPLETION OF THE DISK OPERATION,
139 000027 200100 000025'    MOVE  TAC1,RCXIOC
140 000030 505042 000001      HRLI  TAC,1(TAC1)
141 000031 202040 000177'    MOVEM TAC,RCXFIN
142 000032 402000 000000      SETZM RCXCCW
143                                     ;ZERO THE LOCATION WHERE THE DISK SYNCHRONIZER WILL
144                                     ; STORE THE CHANNEL CONTROL WORD.
145 000033 717140 000201'    DATA0 DSK,DFORDR ;START UP DISK AND DATA CHANNEL.

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;A ROUTINE CALLED DURING SYSTEM INITIALIZATION TO BE SURE DISK IS READY.
; NOTE: THIS ROUTINE DESTROYS ACCUMULATOR TAC.
DISKUP: CONO   DSK,ALLERR!RESETR   ;CLEAR THE DISK SYNCHRONIZER.
          CONSZ  DSK,NRDY!PSF!BUSYBT!DONEFLG   ;ANYTHING AMISS OR STUCK ?
          JRST   DISKUP             ;IF SO, JUST HANG HERE IN A LOOP.
          DATAI DSK,TAC            ;IS THE SECTOR COUNTER GOING ?
          JUMPE  TAC,-1             ;IF NOT, JUST LOOP HERE,
;*** THIS LOOP ABOVE WILL OCCUR DURING INITIALIZATION IF THE DISK IS OFF-LINE. ***
          HRRZI  TAC,DSKBIT        ;IF NOT, ENABLE DISK INTERRUPTS ON THE
          CONO   PI,2200(TAC)      ; APPROPRIATE PRIORITY INTERRUPT CHANNEL.
          POPJ   PDP,              ;SUBROUTINE EXIT.....***
    
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167
168 ;DISK INTERRUPTS COME HERE TO BE SERVICED --
169
170 000050 717360 000170' DSKINT: CONSO DSK,DSKCON ;*DID THE DISK SYNCHRONIZER CAUSE THE INTERRUPT ON
171 000051 254000 000050' JRST ,-1 ;* THIS CHANNEL? IF NOT, GO ON TO THE NFXST DEVICE ON
172 ;* THE SAME PRIORITY INTERRUPT CHANNEL.
173 ; NOTE: THE "JRST ,-1" IS ALTERED BY THE SYSTEM BUILDER PROGRAM.
174
175 000052 717240 000176' CONI DSK,DSKISV ;*SOLELY TO LEAVE FOOTPRINTS.
176 000053 264000 000000' JSR DSKSAV ;*SAVE ACCUMULATORS, ETC.
177 000054 403000 000170' SETZR IOS,DSKCON ;*CLEAR THE DSK I/O STATUS ACCUMULATOR, AND
178 ;* THE INTERRUPT ENABLED MARKER,
179 000055 717300 006000' CONSZ DSK,DATERR ;*SET APPROPRIATE ERROR BITS (IF
180 000056 660000 100000' TR0 IOS,IODTFR ;* ANY) IN ACCUMULATOR IOS FOR
181 000057 717300 371500' CONSZ DSK,DEVERR;SFTERR ;* DEVICE INDEPENDENT ROUTINE TO HANDLE.
182 000060 660000 200000' TR0 IOS,IODERR ;*
183 000061 717300 000200' CONSZ DSK,WRPE ;*
184 000062 660000 400000' TR0 IOS,IOIMPM ;*
185 ;CLEAN OUT THE DISK SYNCHRONIZER AND LEAVE IT DETACHED FROM ITS INTERRUPT CHANNEL.
186
187 000063 717200 377710' CONO DSK,ALLERR;RESETR
188 MOVE TAC,RCXCCW ;*PICK UP THE FINAL VALUE OF THE CHANNEL CONTROL WORD.
189 000064 200040 000032'
190 000065 316040 000177' CAMN TAC,RCXFIN ;*DOES IT AGREE WITH THE SAVED VALUE WE EXPECTED ?
191 000066 254000 000000' JRST DFINT ;* YES, EXIT TO THE DEVICE INDEPENDENT INTERRUPT
192 ;* HANDLING ROUTINE IN "DSKSER".....
193 000067 200100 000176' MOVE TAC1,DSKISV ;*
194 000070 602100 001000' TRNE TAC1,CHCPAR ;*CHANNEL CONTROL WORD PARITY ERROR DETECTED ?
195 000071 254000 000100' JRST DSKNT2 ;*YES, SET ERROR BIT, EXIT TO DSKSER TO TRY 3 TIMES.
196 000072 550100 000177' HRRZ TAC1,RCXFIN ;*NO, STOP DEAD UNLESS THE LAST DATA ADDRESS
197 000073 305101 000000' CAIGE TAC1,(TAC) ;* REFERENCED WAS WITHIN THE RANGE OF THE REQUESTED
198 000074 254000 000102' JRST DSKNT1 ;* TRANSFER. IF IT WAS IN RANGE, SOME ERROR MUST
199 000075 550120 000045' HRRZ TAC1,@RCXIOC ;* HAVE ABORTED PART OF THE DATA TRANSFER, THUS, THE
200 000076 303101 000000' CAILE TAC1,(TAC) ;* "DEVICE ERROR" BIT SHOULD BE TURNED ON BEFORE
201 000077 254000 000102' JRST DSKNT1 ;* EXITING TO THE DEVICE INDEPENDENT ROUTINE.
202 000100 660000 200000' DSKNT2: TR0 IOS,IODERR ;*
203 000101 254000 000066' JRST DFINT ;*
204
205 000102 332000 000064' DSKNT1: SKIPE RCXCCW ;*MAYBE CHANNEL WAS TURNED OFF ?
206 000103 254200 000103' HALT ;*NO--SERIOUS CHANNEL MALFUNCTION--CALL REPAIR MAN!
207 000104 261140 000004' PUSH ;*
208 000105 201200 000000' MOVEI ITEM,0 ;*SEND ERROR MESSAGE TO OPERATOR CONSOLE
209 000106 265040 000000' JSP TAC,FRRPNT ;*
210 000107 422232 345500' ASCIZ /DISK DATA CHANNEL TURNED ON ?
211 000110 422032 440500'
212 000111 416210 147234'
213 000112 426304 052252'
214 000113 512350 542100'
215 000114 476344 037432'
216 000115 050000 000000' /
217 000116 262140 000004'
218 000117 254000 000100' POP PDP,ITEM ;*
219 JRST DSKNT2 ;*

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231                                     ;SUBROUTINE TO CONVERT LOGICAL BLOCK NUMBERS TO PHYSICAL DISK ADDRESSES
232
233                                     ;CALLING SEQUENCE --
234                                     ;   PUSHJ   PDP,CNVBLK
235                                     ;   NORMAL RETURN (ONE "IMPOSSIBLE" ERROR STOP COULD OCCUR)
236                                     ;ENTRY CONDITIONS--
237                                     ;   C(TAC) = RH IS THE LOGICAL BLOCK NUMRER TO BE CONVERTED; LH MAY BE NON-ZERO.
238                                     ;EXIT CONDITIONS--
239                                     ;   C(TAC) = C(DFORDR) = THE CORRESPONDING PHYSICAL DISK ADDRESS CORRECTLY
240                                     ;   POSITIONED FOR A DATA TO THE RC-10 DISK SYNCHRONIZER.
241
242                                     EXTERNAL      ERRPNT,ERRPTU
243
244 000130 202040 000200' CNVBLK: MOVEM TAC,SVLBLK ;ONLY FOR FOOTPRINTS IN CASE OF CRASH.
245 000131 621040 777777'          TLZ   TAC,-1   ;CLEAR NON-USEFUL LEFT HALF OF LOGICAL BLOCK NUMBER.
246                                     INTERNAL     FTRCHK
247                                     IFN      FTRCHK, <
248 000132 313040 000171'          CAMLE TAC,LBHIGH ;IS LOGICAL BLOCK NUMBER IN RANGE ?
249 000133 336000 000171'          SKIPN LBHIGH  ;NO, BUT IF LBHIGH IS STILL 0 WE MUST STILL BE
250 000134 254000 000141'          JRST  CNVBK1   ;DOING THE INITIALIZATION IN "ONCE", SO IT'S OKAY.
251                                     ;INTERNAL MONITOR ERROR IF DSKSER OR SCHEDU COMES HERE WITH A LOGICAL
252                                     ;DISK BLOCK NUMBER THAT IS OUT OF RANGE....
253 000135 254200 000136'          HALT   ,+1     ;HALT ON THIS IMPOSSIBLE ERROR
254 000136 262140 000176'          POP    PDP,DSKISV ;CORRECT PUSH DOWN POINTER AND LEAVE
255                                     ;INDICATOR
256 000137 201000 200000'          MOVEI IOS,IODERR ;UPON CONTINUING PREDEND I/O COMPLETED
257                                     ;WITH DEVICE ERROR,
258 000140 254000 000101'          JRST  DFINT
259 000141                                     CNVBK1:
260 >
261 000141 261140 000002'          PUSH   PDP,TAC1   ;THIS RTN SAVES AND RESTORES TAC1,
262 000142 231040 007640'          IDIVI  TAC,+D4000 ;DETERMINE DISK NUMBER.
263 000143 241040 777776'          ROT    TAC,-2
264 000144 202040 000201'          MOVEM  TAC,DFORDR  ;SAVE DISK NUMBER AWAY.
265 000145 200040 000002'          MOVE   TAC,TAC1
266 000146 231040 000024'          IDIVI  TAC,+D20   ;SELECT TRACK NUMBER.
267 000147 261140 000002'          PUSH   PDP,TAC1
268 000150 231040 000012'          IDIVI  TAC,+D10   ;CONVERT TRACK NUMBER TO BCD.
269 000151 301040 000012'          CAIL  TAC,+D10
270 000152 271040 000006'          ADDI  TAC,6   ;SHORT-CUT BECAUSE FIRST DIGIT IS 0 OR 1.
271 000153 242040 000004'          LSH   TAC,4
272 000154 434040 000002'          OR    TAC,TAC1
273 000155 241040 777765'          ROT   TAC,-+D11
274 000156 436040 000201'          ORM   TAC,DFORDR  ;PUT TRACK NUMBER AWAY ALSO.
275 000157 262140 000001'          POP   PDP,TAC   ;NOW RETRIEVE SEGMENT NUMBER.
276 000160 242040 000002'          LSH   TAC,2     ;MULTIPLY BY 4 (FOUR PHYSICAL
277 000161 231040 000012'          IDIVI  TAC,+D10   ;SEGMENTS PER LOGICAL BLOCK)
278 000162 242040 000004'          LSH   TAC,4
279 000163 434040 000002'          OR    TAC,TAC1  ;SEGMENT NUMBER MUST BE IN BCD ALSO.
280 000164 517000 000001'          HRLZS TAC
281 000165 437040 000201'          ORR   TAC,DFORDR  ;FINALLY, JOIN SEGMENT NUMBER TO
282 000166 262140 000002'          POP   PDP,TAC1  ;EARLIER CALCULATED PARTS OF ADDRESS,
283 000167 263140 000000'          POPJ  PDP,
;SUBROUTINE EXIT.....***

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284          IFN      FTCHECK+FTMONP, <
285          EXTERNAL  RCXDAT      ;TO CAUSE THE CORRECT COPY OF "DSKDAT" TO BE
286                                     ; RETRIEVED BY THE SYSTEM BUILDER.
287          EXTERNAL  DSKCON,WRCHNL,RDCHNL,DSKISV,RCXFIN
288          EXTERNAL  SVLBLK,DFORDR
289          >
290          IFE      FTCHECK+FTMONP, <
291          INTERNAL  DSKCON,LBHIGH,WRCHNL,RDCHNL,DSKISV,RCXFIN,SVLBLK,DFORDR
292 000170 000000 000000 DSKCON: 0 ;ENABLED INTERRUPT CONDITIONS STORED HERE BY "STARTDV",
293 000171 000000 000000 LBHIGH: 0 ;HIGHEST LEGAL LOGICAL BLOCK NUMBER,
294 000172 000000 000000 WRCHNL: 0 ;CHANNEL CONTROL WORD OF LAST DISK WRITE,
295 000173 000000 000000          Z ;CHANNEL TERMINATION WORD,
296 000174 000000 000000 RDCHNL: 0 ;CHANNEL CONTROL WORD OF LAST DISK READ,
297 000175 000000 000000          Z ;ZERO WORD TO TERMINATE CHANNEL,
298 000176 000000 000000 DSKISV: 0 ;RESULT OF LAST CONI ON A DISK INTERRUPT,
299 000177 000000 000000 RCXFIN: 0 ;EXPECTED VALUE OF CHANNEL CONTROL WORD (RCXCCW) AT
300                                     ; THE END OF THE CURRENT DISK TRANSFER,
301 000200 000000 000000 SVLBLK: 0 ;LAST LOGICAL BLOCK NUMBER CONVERTED,
302 000201 000000 000000 DFORDR: 0 ;ITS CORRESPONDING PHYSICAL DISK ADDRESS.

303          >
304 000202          DSKEND: END
  
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NO ERRORS DETECTED

PROGRAM BREAK IS 000202

ALLERR	377700	RUSYRT	000000	CHCPAR	001000
CHDPAR	002000	CNVBK1	000141'	CNVBLK	000130'
DATERR	006000	DCHNPE	002000	DDE	100000
DDSKPE	004000	DEVERR	211100	DFINT	000140' FXT
DFOROR	000201' INT	DFRED	000035' INT	DFWRT	000000' INT
DFWRTC	000013'	DISKUP	000120' INT	DONEFL	000010
DPAR	004000	DSK	000170	DSKBIT	000125' FXT
DSKCHN	000015' EXT	DSKCON	000170' INT	DSKEND	000202'
DSKFDG	000015' INT	DSKINT	000050' INT	DSKISV	000176' INT
DSKNT1	000102'	DSKNT2	000100'	DSKSAV	000053' FXT
DTIP	400000	ERRPNT	000106' EXT	ERRPTU	000000 FXT
FTCHEC	000000 INT	FTMONP	000000 INT	FTRCHK	777777 INT
IODERR	200000 INT	IODTER	100000 INT	IOIMPM	400000 INT
IOS	000000 INT	ITEM	000004 INT	LBHIGH	000171' INT
MSS	010000 000000	NRDY	020000	NXMEM	000400
OVR	000100	PDP	000003 INT	PIOFF	000020' FXT
PION	000023' EXT	PLGSW	004000 000000	PSF	010000
RCXCCW	000102' EXT	RCXFIN	000177' INT	RCXINT	000000' INT
RCXIOC	000075' EXT	RDCHNL	000174' INT	RESETB	000010
SATM2	000042' EXT	SFTEPR	160400	SRCHE	200000
STPBIT	000020	SVLBLK	000220' INT	TAC	000001 INT
TAC1	000002 INT	TSE	040000	VDSKIT	000403 INT
WRPIT	001000	WRCCND	000040	WRCHNL	000172' INT
WRPE	000200				

A	6#	6		
AC1	6#	6		
AC2	6#	6		
AC3	6#			
AEFERR	6#	6		
AL	6#	6		
ALLERR	55#	126	187	222
ASSCON	6#	6		
ASSPRG	6#	6		
B	6#	6		
BUFNT	6#	6		
BUFWRD	6#	6		
BUSYBT	47#	104	149	223
CHCPAR	41#	53	194	
CHDPAR	40#	52		
CLKR	6#	6		
CLSIN	6#	6		
CLSOUT	6#	6		
CMWB	6#	6		
CNVBK1	250	259#		
CNVBLK	120	163	244#	
CORCNT	6#	6		
D	6#	6		
DAT	6#	6		
DATERR	52#	55	179	
DCHNPE	85#			
DCL	6#	6		
DCLI	6#	6		
DCLO	6#	6		
DCLR	6#	6		
DDE	35#	54		
DDI	6#	6		
DDO	6#	6		
DDSKPE	84#			
DEN	6#	6		
DEVADR	6#	6		
DEVBUF	6#	6		
DEVCHR	6#	6		
DEVCTR	6#	6		
DEVDAT	6#	6		
DEVERR	53#	55	181	
DEVEXT	6#	6		
DEVFIL	6#	6		
DEVIAD	6#	6		
DEVIOS	6#	6		
DEVLOG	6#	6		
DEVMOD	6#	6		
DEVNAM	6#	6		
DEVOAD	6#	6		
DEVPN	6#	6		
DEVPTR	6#	6		
DEVSER	6#	6		
DFINT	17	191	203	258

FNFERR	6#	6					
FRGSEG	6#	6					
FT2REL	6#						
FTATTA	6#						
FTCHEC	6#	15	284	290			
FTEXAM	6#						
FTFINI	6#						
FTGETT	6#						
FTHALT	6#						
FTKCT	6#						
FTMONP	6#	15	284	290			
FTPRV	6#						
FTRA10	6#						
FTRCHK	6#	15	109	154	246	247	
FTREAS	6#						
FTSLFE	6#						
FTTALK	6#						
FTTIME	6#						
FTTRAC	6#						
FTTRPS	6#						
FTTYS	6#						
HSAMSK	6#	6					
HSAPOS	6#	6					
HSASIZ	6#	6					
HUNGCT	6#	6					
HUNGST	6#	6					
I	6#	6					
IB	6#	6					
IBUFB	6#	6					
ICLOSB	6#	6					
ILM	6#						
ILUERR	6#	6					
INRFB	6#	6					
INITR	6#	6					
INPB	6#	6					
IO	6#	6					
IOACT	6#	6					
IOBEG	6#	6					
IOBKTL	6#	6					
IOBOT	6#	6					
IOCON	6#	6					
IODEND	6#	6					
IODERR	6#	6	182	202	256		
IODTER	6#	6	180				
IOEND	6#	6					
IOFST	6#	6					
IOIMPM	6#	6	184				
IONRCK	6#	6					
IOPAR	6#	6					
IOS	6#	6	177	180	182	184	202
IOTEND	6#	6					256
IOUSE	6#	6					
IOW	6#	6					

CODES	6#		
DISABL	6#		
ENABLE	6#		
NOSCHE	6#		
NOSHUF	6#		
QUEUES	6#		
SCHEDU	6#		
SHUFFL	6#		
STARTD	6#	129	
XP	6#	6	9